

Topic

Thermal Effects

Governing Equations and Assumptions

$$\epsilon_T = \alpha \Delta T$$

$$\epsilon = \frac{\delta}{L}$$

$$\delta = \frac{PL}{EA}$$

$$\sigma_T = \frac{P}{A}$$

Process

① Determine ϵ_T and δ_T if the object was free to expand or contract

② Determine δ_R
 $\Rightarrow \delta_T - \text{any gaps}$

③ Determine the force and stress

$$\delta_R = \frac{PL}{EA} \quad , \quad \sigma_T = \frac{P}{A}$$